

IESNA LM-80: 2008

6000 Hours Measurement and Test Report

for

Shenzhen Lepower Opto Electronics Corp., Ltd.

Building B, Chuangfu Science Technology Park, Beihuan Rd., Shiyan Town, Bao'an District, Shenzhen, China

Product Name:	Power LED
Model No:	2828-24
Tested By:	David Zhang 
Report No.:	BTR66.181.15.0010.40
Test Initiation Date:	Jan 20, 2015
Revision Date:	Oct 13, 2015
Test Completion Date:	Oct 09, 2015
Reviewed By:	Steven Hsu 
Prepared By:	Best Test Service Shenzhen Co., Ltd. 1st Floor, 1st Building, Weitai Industrial Park, Yingrenshi, Shiyan, Shenzhen, Guangdong, 518108 China TEL: +86-755-28236006 FAX: +86-755-23467087-811 Email: certification@bestcert.cn



Note: The test report only allows to be revised within the retention period unless further standard or the requirement was noticed. This report is for the exclusive use of BEST's Client and is provided pursuant to the agreement between BEST and its Client. BEST's responsibility and Liability are limited to the terms and conditions of the agreement. BEST assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Any use of the BEST name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by BEST. The observations and test results in this report are relevant only to the sample tested. This report by itself does not cover that the material, product, of service is or has ever been under a BEST certification program. National Voluntary Laboratory Accreditation Program (NVLAP) has accredited this laboratory under ISO17025: 2005 for specific laboratory activities as listed in the NVLAP directory of accredited laboratories. The results shown in this report were determined by this laboratory in accordance with its terms of accreditation. This report must not be used by the client to claim product endorsement by NVLAP, NIST or any agency of the U.S. Government.

TABLE OF CONTENTS

1 - GENERAL INFORMATION.....3
1.1 PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)3
1.2 OBJECTIVE4
1.3 TEST FACILITY DESCRIPTION.....4
1.4 TEST EQUIPMENT LIST4

2 – SUMMARY OF TEST RESULT5

3 - TEST METHOD.....6

4 – DATA SET 1: 55°C; 1080MA.....7

5 – DATA SET 2: 85°C; 1080 MA.....10

6 – DATA SET 3: 105°C; 1080 MA.....13

7 – SUMMARY16

8 – EUT PHOTOS.....17

9 –TMP18

10 –APPENDIX (APPLICABLE PRODUCT SERIES)19



1 - GENERAL INFORMATION

1.1 Product Description for Equipment under Test (EUT)

Applicant	:	Shenzhen Lepower Opto Electronics Corp., Ltd.
Model Name	:	Power LED
Model Number	:	2828-24
Number of LED Light Source tested	:	See tables.
Description of auxiliary Equipment	:	Labsphere 50cm 2II Integrating Sphere Labsphere CDS2100 Spectrometer Keithley 2420 Sourcemeter ESPEC PH301 Temperature Chamber
Operating Cycle	:	Constant current.
Ambient Conditions	:	LED light source are operated in environmental control chambers. The temperature of the ambient air around the LED light source is actively controlled by air flowing through the chamber. T _A : See tables; RH : < 45%; Air flow : 300 CFM
Case temperature (test point temperature)	:	See Section 11.
Drive current of the LED light source during lifetime test	:	See tables.
Initial luminous flux and forward voltage at photometric measurement current	:	See tables.
Lumen maintenance data for each individual LED light source along with median value, standard deviation, minimum and maximum lumen maintenance value for all of the LED Light sources	:	See tables.
Observation of LED light source failures including the failure conditions and time of failure.	:	See tables.
LED light source monitoring interval	:	The LED light sources are inspected at regular intervals (24 hours) throughout the 6000 hours test.
Photometric measurement uncertainty	:	+/- 1.5% on flux measurements for LM- 80 testing.
Chromaticity shift reported over the Measurement time	:	See tables.
Stabilization Time	:	0.75 hours
LED Light Source Test interval	:	At regular intervals (1000 hours) throughout the 6000 hours test.
Date of Receiving Sample	:	Jan 20, 2015
Test Duration	:	Jan 20, 2015 to Oct 09, 2015

1.2 Objective

The following test report is prepared on behalf of Shenzhen Lepower Opto Electronics Corp., Ltd. in accordance with IESNA LM-80-08, used the following American National Standards or illumination Engineering Society of North America test guides:

Measurement of LEDs (2nd ed.), CIE 127:2007; IESNA Testing Procedures Committee. IESNA LM-79-2008 Approved Method for the Electrical and Photometric Measurements of LED Light Sources, New York: Illuminating Engineering Society of North America, 2008.

ASSIST Recommends: LED Life Testing. Vol. 1-6, 2005. Lighting Research Center, Rensselaer Polytechnic Institute, Troy, NY, 2005.

ANSI/IESNA Testing Procedures Committee, IESNA RP-16-07, Nomenclature and Definitions for Illuminating Engineering. See also Addendum A on solid-state lighting (Document is now continuously updated)

IESNA Testing Procedures Committee, IESNA LM-40-01, Approved Method for Life Performance Testing of Fluorescent Lamps, New York: Illuminating Engineering Society of North America, 2001.

1.3 Test Facility Description

The Energy Efficiency Lab used by BEST to collect energy efficiency measurement data is located in 1st Floor, 1st Building, Weitai Industrial Park, Yingrenshi, Shiyao, Baoan, Shenzhen, China. BEST Test Service Shenzhen Co., Ltd is a EPA recognized lab for lighting products, BEST is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200770-0). BEST Test Service Shenzhen Co., Ltd is also an ELI accredited lab for lighting products (ELI Certificate No. ELI-L04-2010) and UL accredited lab for lighting products

1.4 Test Equipment List

Apparatus List	Device	Cal. Date	Cal Due Date
1	Integral Sphere+ Spectroradiometer	Calibrated before Test	
2	Standard Light Source	Mar 10, 2015	Mar 09, 2016
3	Source Meter	Oct 18, 2014	Oct 17, 2015
4	Temperature Chamber	Sep 17, 2015	Sep 16, 2016
5	Multi Channel LED Aging Source	Sep 17, 2015	Sep 16, 2016
6	6 ^{1/2} Digital Multimeter	Mar 28, 2015	Mar 27, 2016
7	Temperature Controller	Oct 18, 2014	Oct 17, 2015
8	Second Meter	Oct 18, 2014	Oct 17, 2015

Statement of Traceability: BEST Test Service Shenzhen Co., Ltd. certifies that all calibration has been performed using suitable standards traceable to the NIM China.

2 – Summary of Test Result

Data Set	Case Temperature(Ts) ℃	Ambient Temperature(Ta) ℃	Drive Current(mA)	Average Lumen Maintenance at 6,000 hours	Average Chromaticity Shift ($\Delta u'v'$) at 6,000 hours
1	55	55±2	1080.0	94.3%	0.0026
2	85	85±2	1080.0	93.3%	0.0033
3	105	105±2	1080.0	92.0%	0.0040



3 - Test Method

3.1 Photometric and Electrical Measurement

Total light output (luminous flux) for the $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$ ambient temperature conditions is measured using a Labsphere 50cm 2 Π geometry integrating sphere. Temperature is controlled and measured at manufacture defined TMP inside the sphere. Spectral radiant flux measurements are made using Labsphere CDS 2100 to the detector port of the integrating sphere. Each LED package is operated at rated drive current (CC Mode). Each package should be stable before measurements are made. The determining method of stable is as follows:

Step 1 Take 3 measurements of the lamp light output at 15 minute interval (total time=30mintues.)This time period is in addition to the recommended pre-burning time.

Step 2 Calculate the percent difference between the maximum measured value and the minimum measured value for the three consecutive measurements.

Step 3 if the value calculated in Step 2 does not exceed 0.5 percent, the lamp is considered stable.

Luminous flux, chromaticity coordinates, correlated color temperature and color rendering index for each lamp are calculated from the spectral radiant flux measurements taken at 2 nm intervals over the range 350 to 1050 nm. The calibration of the sphere photometer-spectrometer system is traceable to the NIST USA. The EUT fed under CC mode at rated input by KEITHLEY 2420 power source.

The total uncertainty of the light output measurements is estimated, at the 95% confidence level, not to exceed $\pm 1.6\%$ over the wavelength range 350-1050 nm.

3.2 Season the LED light source from 0 hour to 6000 hours

Three ESPEC Temperature Chambers are using for Season, and the temperature is set to 55°C , 85°C , 105°C , the airflow is minimum to keep the uniformity of temperature.LED light source are operated steady state (no cycling) for a period of 6000 hours, checked the lumen flux and Chromaticity Shift every 1000 hours. The samples are inspected at regular intervals (12 hours) throughout the 6000hours. The time and date of failure of each lamp is recorded. The actual elapsed time for each light source is in hour.

4 – Data Set 1: 55°C; 1080mA

Description of Light Sources tested	:	2828-24
Case Temperature	:	55°C
Ambient Temperature	:	55°C
Drive Current	:	1080 mA
Measure Current	:	1080 mA
Failures Observed	:	None

INITIAL DATA								
Sample No.	Ref. Voltage (V)	Forward Current (mA)	Luminous Flux (Lumens)	CCT (K)	x (CIE 1931)	y (CIE 1931)	u' (CIE 1976)	v' (CIE 1976)
L1	36.25	1080.0	4546.80	3012	0.4356	0.4028	0.2503	0.5207
L2	36.20	1080.0	4508.20	3038	0.4336	0.4016	0.2495	0.5199
L3	36.10	1080.0	4421.80	3043	0.4321	0.3993	0.2495	0.5188
L4	36.16	1080.0	4491.30	3038	0.4326	0.3996	0.2497	0.5189
L5	36.21	1080.0	4493.30	2986	0.4381	0.4046	0.2511	0.5218
L6	36.37	1080.0	4694.10	3037	0.4342	0.4030	0.2493	0.5205
L7	36.31	1080.0	4641.40	3095	0.4291	0.3990	0.2477	0.5182
L8	36.40	1080.0	4692.30	3020	0.4347	0.4019	0.2501	0.5202
L9	36.40	1080.0	4730.40	3111	0.4276	0.3978	0.2472	0.5175
L10	36.10	1080.0	4533.30	3124	0.4261	0.3959	0.2471	0.5165
AV	36.25	1080.0	4575.29	3050	0.4324	0.4006	0.2492	0.5193
MIN	36.10	1080.0	4421.80	2986	0.4261	0.3959	0.2471	0.5165
MAX	36.40	1080.0	4730.40	3124	0.4381	0.4046	0.2511	0.5218
STDEV	0.12	0.0	105.75	45	0.0037	0.0027	0.0014	0.0016
N	10	10	10	10	10	10	10	10

Description of Light Sources tested	:	2828-24
Case Temperature	:	55°C
Ambient Temperature	:	55°C
Drive Current	:	1080 mA
Measure Current	:	1080 mA
Failures Observed	:	None

LUMEN MAINTENANCE							
Sample No.	0H	1000H	2000H	3000H	4000H	5000H	6000H
L1	100.0%	99.6%	99.2%	98.4%	97.5%	96.4%	94.6%
L2	100.0%	99.4%	98.5%	97.7%	96.8%	95.7%	94.1%
L3	100.0%	99.3%	98.9%	98.1%	97.2%	96.0%	94.4%
L4	100.0%	99.6%	98.9%	98.1%	96.6%	95.5%	93.9%
L5	100.0%	99.6%	99.1%	98.4%	97.5%	96.3%	94.8%
L6	100.0%	99.5%	98.7%	97.9%	96.5%	95.4%	93.9%
L7	100.0%	99.5%	99.1%	98.3%	97.5%	96.4%	94.9%
L8	100.0%	99.5%	98.7%	97.9%	96.5%	95.4%	93.9%
L9	100.0%	99.5%	98.8%	98.0%	96.7%	95.7%	94.2%
L10	100.0%	99.5%	99.1%	98.3%	97.4%	96.3%	94.7%
AV	100.0%	99.5%	98.9%	98.1%	97.0%	95.9%	94.3%
MIN	100.0%	99.3%	98.5%	97.7%	96.5%	95.4%	93.9%
MAX	100.0%	99.6%	99.2%	98.4%	97.5%	96.4%	94.9%
STDEV	0.0%	0.1%	0.2%	0.2%	0.4%	0.4%	0.4%
N	10	10	10	10	10	10	10

Test Condition 1 - 55°C Case Temp	
Sample size	10
Number of failures	0
DUT drive current used in the test (mA)	1080
Test duration (hours)	6,000
Test duration used for projection (hour to hour)	1,000 - 6,000
Tested case temperature (°C)	55
α	1.063E-05
B	1.010
Reported L70(6k)	>33000

Description of Light Sources tested	:	2828-24
Case Temperature	:	55°C
Ambient Temperature	:	55°C
Drive Current	:	1080 mA
Measure Current	:	1080 mA
Failures Observed	:	None

$\Delta u'v'$							
Sample No.	0H	1000H	2000H	3000H	4000H	5000H	6000H
L1	0.0003	0.0010	0.0013	0.0015	0.0019	0.0021	0.0025
L2	0.0005	0.0009	0.0012	0.0015	0.0018	0.0021	0.0025
L3	0.0013	0.0010	0.0013	0.0020	0.0024	0.0023	0.0027
L4	0.0012	0.0010	0.0013	0.0015	0.0019	0.0021	0.0025
L5	0.0001	0.0010	0.0013	0.0015	0.0019	0.0021	0.0025
L6	0.0001	0.0012	0.0015	0.0017	0.0020	0.0023	0.0027
L7	0.0009	0.0010	0.0013	0.0015	0.0019	0.0021	0.0025
L8	0.0006	0.0015	0.0017	0.0020	0.0023	0.0026	0.0029
L9	0.0012	0.0010	0.0013	0.0015	0.0019	0.0021	0.0025
L10	0.0017	0.0011	0.0014	0.0016	0.0020	0.0022	0.0026
AV	0.0008	0.0011	0.0014	0.0017	0.0020	0.0022	0.0026
MIN	0.0001	0.0009	0.0012	0.0015	0.0018	0.0021	0.0025
MAX	0.0017	0.0015	0.0017	0.0020	0.0024	0.0026	0.0029
STDEV	0.0006	0.0002	0.0002	0.0002	0.0002	0.0001	0.0001
N	10	10	10	10	10	10	10

5 – Data Set 2: 85°C; 1080 mA

Description of Light Sources tested	:	2828-24
Case Temperature	:	85°C
Ambient Temperature	:	85°C
Drive Current	:	1080 mA
Measure Current	:	1080 mA
Failures Observed	:	None

INITIAL DATA								
Sample No.	Ref. Voltage (V)	Forward Current (mA)	Luminous Flux (Lumens)	CCT (K)	x (CIE 1931)	y (CIE 1931)	u' (CIE 1976)	v' (CIE 1976)
L11	36.29	1080.0	4667.40	3112	0.4272	0.3970	0.2473	0.5171
L12	36.20	1080.0	4605.70	3117	0.4270	0.3971	0.2471	0.5171
L13	36.24	1080.0	4600.20	3024	0.4342	0.4014	0.2500	0.5199
L14	36.87	1080.0	4278.20	3129	0.4262	0.3968	0.2468	0.5169
L15	36.18	1080.0	4563.10	3049	0.4331	0.4021	0.2490	0.5200
L16	36.20	1080.0	4490.00	2985	0.4382	0.4047	0.2511	0.5218
L17	36.22	1080.0	4531.20	3034	0.4329	0.3999	0.2498	0.5191
L18	36.19	1080.0	4483.50	3038	0.4326	0.3997	0.2497	0.5190
L19	36.21	1080.0	4513.70	3036	0.4336	0.4017	0.2495	0.5199
L20	36.19	1080.0	4497.60	3015	0.4353	0.4025	0.2502	0.5205
AV	36.28	1080.0	4523.06	3054	0.4320	0.4003	0.2491	0.5191
MIN	36.18	1080.0	4278.20	2985	0.4262	0.3968	0.2468	0.5169
MAX	36.87	1080.0	4667.40	3129	0.4382	0.4047	0.2511	0.5218
STDEV	0.21	0.0	104.69	48	0.0040	0.0027	0.0015	0.0016
N	10	10	10	10	10	10	10	10

Description of Light Sources tested	:	2828-24
Case Temperature	:	85°C
Ambient Temperature	:	85°C
Drive Current	:	1080 mA
Measure Current	:	1080 mA
Failures Observed	:	None

LUMEN MAINTIANCE							
Sample No.	0H	1000H	2000H	3000H	4000H	5000H	6000H
L11	100.0%	99.3%	98.6%	98.3%	96.7%	95.4%	93.7%
L12	100.0%	99.1%	99.6%	97.4%	96.3%	95.2%	92.8%
L13	100.0%	99.2%	98.5%	97.9%	96.8%	95.3%	93.6%
L14	100.0%	99.2%	98.5%	97.8%	96.6%	95.4%	93.3%
L15	100.0%	99.2%	98.5%	97.6%	96.5%	94.8%	93.0%
L16	100.0%	99.0%	98.3%	97.7%	96.5%	95.4%	93.6%
L17	100.0%	99.1%	98.5%	97.8%	96.7%	95.0%	93.2%
L18	100.0%	99.2%	98.5%	97.6%	96.5%	95.4%	93.6%
L19	100.0%	99.0%	98.3%	97.2%	96.1%	94.5%	92.7%
L20	100.0%	99.2%	98.5%	97.7%	96.5%	95.3%	93.5%
AV	100.0%	99.1%	98.6%	97.7%	96.5%	95.2%	93.3%
MIN	100.0%	99.0%	98.3%	97.2%	96.1%	94.5%	92.7%
MAX	100.0%	99.3%	99.6%	98.3%	96.8%	95.4%	93.7%
STDEV	0.0%	0.1%	0.4%	0.3%	0.2%	0.3%	0.3%
N	10	10	10	10	10	10	10

Test Condition 2 - 85°C Case Temp	
Sample size	10
Number of failures	0
DUT drive current used in the test (mA)	1080
Test duration (hours)	6,000
Test duration used for projection (hour to hour)	1,000 - 6,000
Tested case temperature (°C)	85
α	1.198E-05
B	1.009
Reported L70(6k)	30,000

Description of Light Sources tested	:	2828-24
Case Temperature	:	85°C
Ambient Temperature	:	85°C
Drive Current	:	1080 mA
Measure Current	:	1080 mA
Failures Observed	:	None

$\Delta u'v'$							
Sample No.	0H	1000H	2000H	3000H	4000H	5000H	6000H
L11	0.0014	0.0012	0.0017	0.0020	0.0022	0.0025	0.0028
L12	0.0014	0.0014	0.0022	0.0025	0.0027	0.0030	0.0034
L13	0.0007	0.0015	0.0021	0.0024	0.0027	0.0029	0.0033
L14	0.0014	0.0016	0.0023	0.0026	0.0029	0.0031	0.0035
L15	0.0003	0.0014	0.0023	0.0025	0.0028	0.0031	0.0034
L16	0.0001	0.0012	0.0016	0.0020	0.0022	0.0025	0.0029
L17	0.0011	0.0016	0.0022	0.0025	0.0027	0.0030	0.0034
L18	0.0012	0.0014	0.0020	0.0024	0.0027	0.0029	0.0033
L19	0.0005	0.0016	0.0023	0.0026	0.0029	0.0031	0.0035
L20	0.0004	0.0016	0.0022	0.0024	0.0027	0.0029	0.0033
AV	0.0008	0.0015	0.0021	0.0024	0.0026	0.0029	0.0033
MIN	0.0014	0.0012	0.0016	0.0020	0.0022	0.0025	0.0028
MAX	0.0001	0.0016	0.0023	0.0026	0.0029	0.0031	0.0035
STDEV	0.0005	0.0002	0.0003	0.0002	0.0002	0.0002	0.0002
N	10	10	10	10	10	10	10

6 – Data Set 3: 105°C ; 1080 mA

Description of Light Sources tested	:	2828-24
Case Temperature	:	105°C
Ambient Temperature	:	105°C
Drive Current	:	1080 mA
Measure Current	:	1080 mA
Failures Observed	:	None

INITIAL DATA								
Sample No.	Ref.Voltage (V)	Forward Current (mA)	Luminous Flux (Lumens)	CCT (K)	x (CIE 1931)	y (CIE 1931)	u' (CIE 1976)	v' (CIE 1976)
L21	36.41	1080.0	4625.30	3000	0.4368	0.4037	0.2506	0.5212
L22	36.17	1080.0	4509.70	3030	0.4341	0.4018	0.2497	0.5200
L23	36.22	1080.0	4524.30	3030	0.4332	0.4000	0.2499	0.5192
L24	36.29	1080.0	4600.20	3024	0.4337	0.4004	0.2501	0.5195
L25	36.14	1080.0	4481.60	2980	0.4384	0.4047	0.2513	0.5218
L26	36.18	1080.0	4598.10	3042	0.4336	0.4023	0.2492	0.5202
L27	36.25	1080.0	4628.00	3094	0.4291	0.3989	0.2477	0.5182
L28	36.07	1080.0	4508.60	3030	0.4336	0.4007	0.2498	0.5196
L29	36.17	1080.0	4599.80	3118	0.4269	0.3971	0.2471	0.5171
L30	36.29	1080.0	4668.20	3112	0.4272	0.3970	0.2473	0.5171
AV	36.22	1080.0	4574.38	3046	0.4327	0.4007	0.2493	0.5194
MIN	36.07	1080.0	4481.60	2980	0.4269	0.3970	0.2471	0.5171
MAX	36.41	1080.0	4668.20	3118	0.4384	0.4047	0.2513	0.5218
STDEV	0.10	0.0	63.05	47	0.0038	0.0026	0.0014	0.0016
N	10	10	10	10	10	10	10	10

Description of Light Sources tested	:	2828-24
Case Temperature	:	105°C
Ambient Temperature	:	105°C
Drive Current	:	1080 mA
Measure Current	:	1080 mA
Failures Observed	:	None

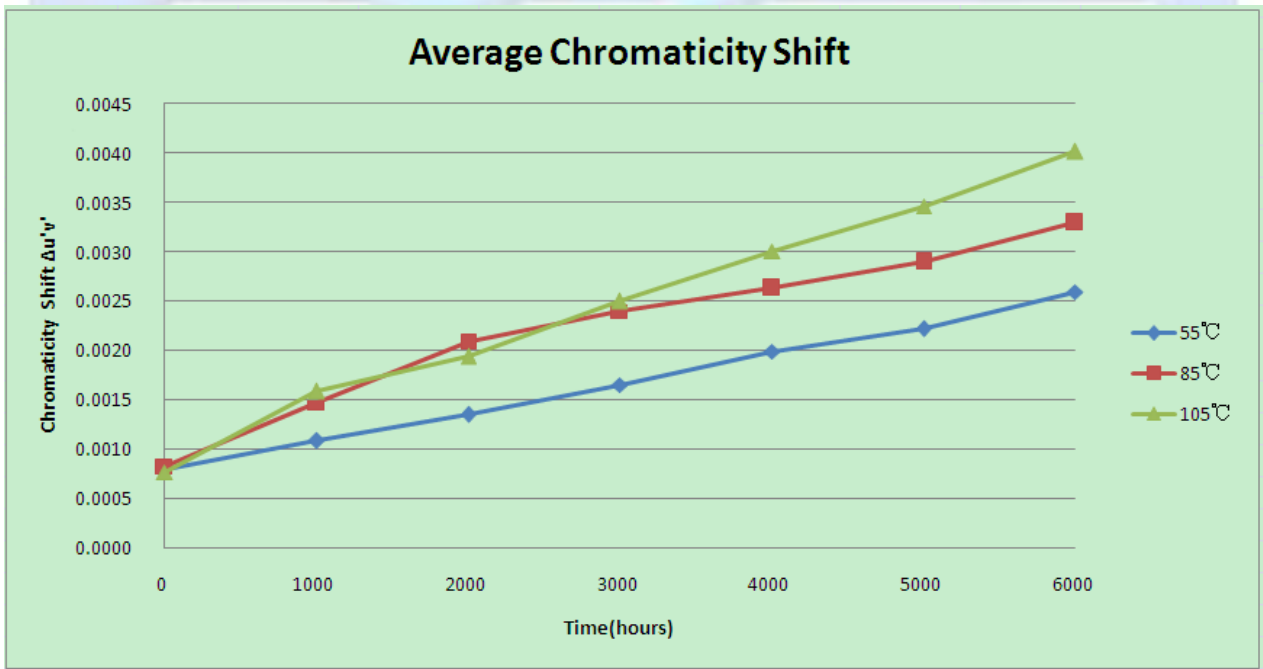
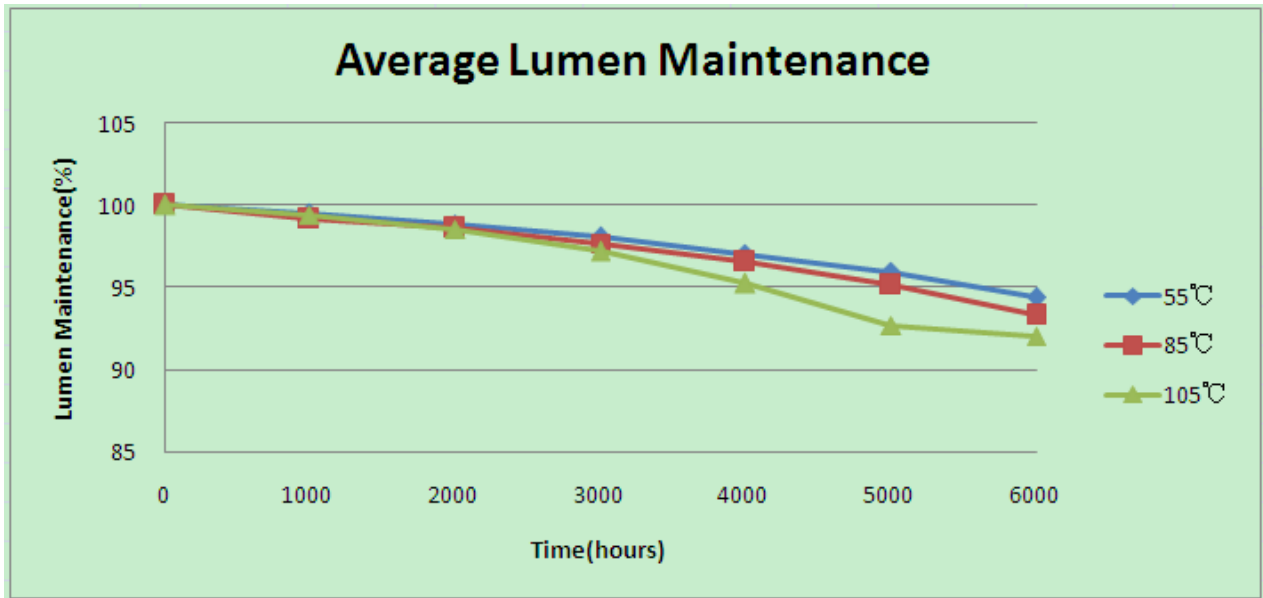
LUMEN MAINTENANCE							
Sample No.	0H	1000H	2000H	3000H	4000H	5000H	6000H
L21	100.0%	99.7%	98.9%	97.6%	95.6%	93.0%	92.4%
L22	100.0%	99.5%	98.6%	97.2%	95.3%	92.6%	91.9%
L23	100.0%	99.5%	98.6%	97.3%	95.3%	92.7%	92.0%
L24	100.0%	99.6%	98.7%	97.4%	95.4%	92.8%	92.1%
L25	100.0%	99.3%	98.5%	97.1%	95.1%	92.4%	91.8%
L26	100.0%	99.2%	98.4%	97.1%	95.1%	92.5%	91.8%
L27	100.0%	99.5%	98.6%	97.3%	95.3%	92.8%	92.1%
L28	100.0%	99.5%	98.6%	97.3%	95.3%	92.6%	92.0%
L29	100.0%	99.3%	98.5%	97.2%	95.2%	93.2%	92.5%
L30	100.0%	99.1%	98.2%	96.9%	95.0%	92.4%	91.8%
AV	100.0%	99.4%	98.5%	97.2%	95.3%	92.7%	92.0%
MIN	100.0%	99.1%	98.2%	96.9%	95.0%	92.4%	91.8%
MAX	100.0%	99.7%	98.9%	97.6%	95.6%	93.2%	92.5%
STDEV	0.0%	0.2%	0.2%	0.2%	0.2%	0.2%	0.3%
N	10	10	10	10	10	10	10

Test Condition 3 - 105°C Case Temp	
Sample size	10
Number of failures	0
DUT drive current used in the test (mA)	1080
Test duration (hours)	6,000
Test duration used for projection (hour to hour)	1,000 - 6,000
Tested case temperature (°C)	105
α	1.682E-05
B	1.016
Reported L70(6k)	22,000

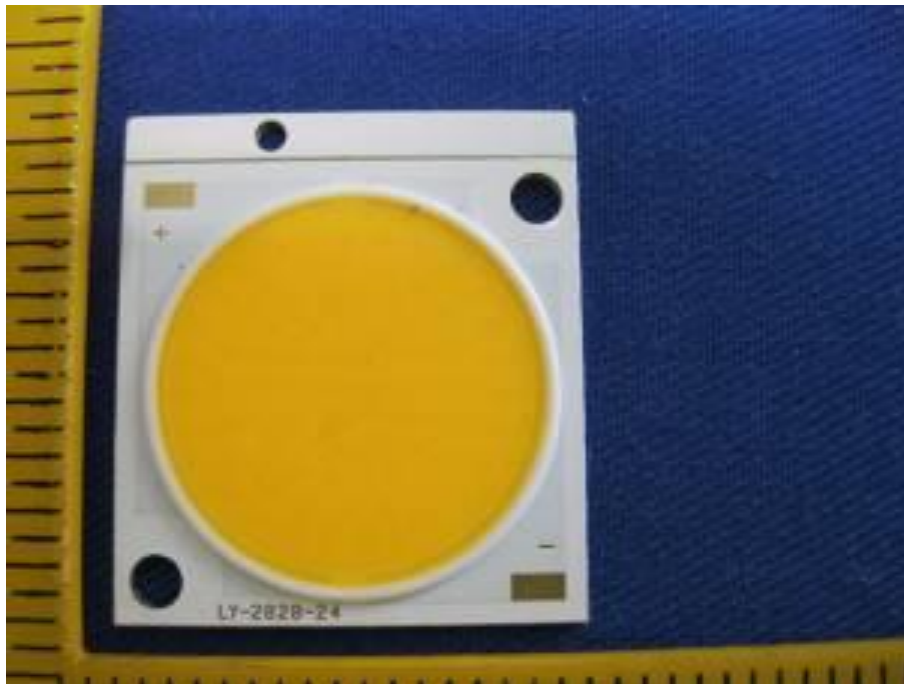
Description of Light Sources tested	:	2828-24
Case Temperature	:	105°C
Ambient Temperature	:	105°C
Drive Current	:	1080 mA
Measure Current	:	1080 mA
Failures Observed	:	None

$\Delta u'v'$							
Sample No.	0H	1000H	2000H	3000H	4000H	5000H	6000H
L21	0.0001	0.0013	0.0020	0.0021	0.0024	0.0027	0.0033
L22	0.0005	0.0014	0.0017	0.0019	0.0023	0.0026	0.0032
L23	0.0011	0.0015	0.0019	0.0021	0.0026	0.0030	0.0035
L24	0.0010	0.0017	0.0020	0.0026	0.0030	0.0035	0.0040
L25	0.0000	0.0015	0.0017	0.0024	0.0029	0.0034	0.0039
L26	0.0002	0.0019	0.0019	0.0027	0.0033	0.0038	0.0044
L27	0.0010	0.0015	0.0021	0.0030	0.0035	0.0043	0.0049
L28	0.0009	0.0019	0.0020	0.0026	0.0030	0.0034	0.0042
L29	0.0014	0.0015	0.0021	0.0030	0.0035	0.0039	0.0045
L30	0.0015	0.0015	0.0021	0.0026	0.0034	0.0039	0.0043
AV	0.0008	0.0016	0.0019	0.0025	0.0030	0.0035	0.0040
MIN	0.0015	0.0013	0.0017	0.0019	0.0023	0.0026	0.0032
MAX	0.0000	0.0019	0.0021	0.0030	0.0035	0.0043	0.0049
STDEV	0.0005	0.0002	0.0002	0.0004	0.0004	0.0006	0.0005
N	10	10	10	10	10	10	10

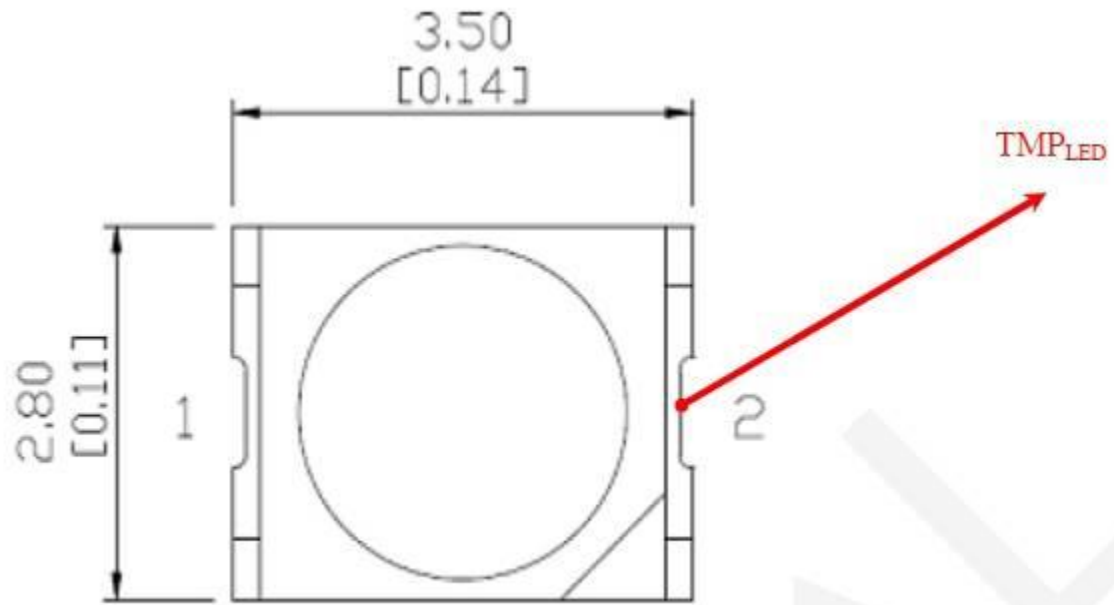
7 – Summary



8 – EUT Photos



9 –TMP



10 –Appendix (Applicable product series)

Light sources Tested:

Product	Size	Die count in series	Die count in parallel	CCT	CRI
	28*28*1.0mm	12	10	3000K	80
	Die Count	Drive Current	Nominal Voltage	Nominal Power	Nominal Light output
2828-24	120	1080mA	36V	40W	4000lm
	Drive Current per die	Current Density	Power Density	Die Spacing	
	0.12A	0.0025A/mm ²	0.095W/mm ²	4.08mm ² /pcs	

Applicable Product:

Product	Size	Die count in series	Die count in parallel	CCT	CRI
	16*16*1.0mm	12	2	3000K	80
	Die Count	Drive Current	Nominal Voltage	Nominal Power	Nominal Light output
1616-9	24	250mA	36V	9W	900lm
	Drive Current per die	Current Density	Power Density	Die Spacing	
	0.12A	0.0025A/mm ²	0.095W/mm ²	3.95mm ² /pcs	

Product	Size	Die count in series	Die count in parallel	CCT	CRI
	13*13*1.0mm	12	2	3000K	80
	Die Count	Drive Current	Nominal Voltage	Nominal Power	Nominal Light output
1313-11	24	250mA	36V	9W	900lm
	Drive Current per die	Current Density	Power Density	Die Spacing	
	0.12A	0.0025A/mm ²	0.095W/mm ²	3.95mm ² /pcs	

Product	Size	Die count in series	Die count in parallel	CCT	CRI
	19*19*1.0mm	12	4	3000K	80
	Die Count	Drive Current	Nominal Voltage	Nominal Power	Nominal Light output
1919-17	48	480mA	36V	17W	1530lm
	Drive Current per die	Current Density	Power Density	Die Spacing	
	0.095A	0.0021A/mm ²	0.075W/mm ²	4.7mm ² /pcs	

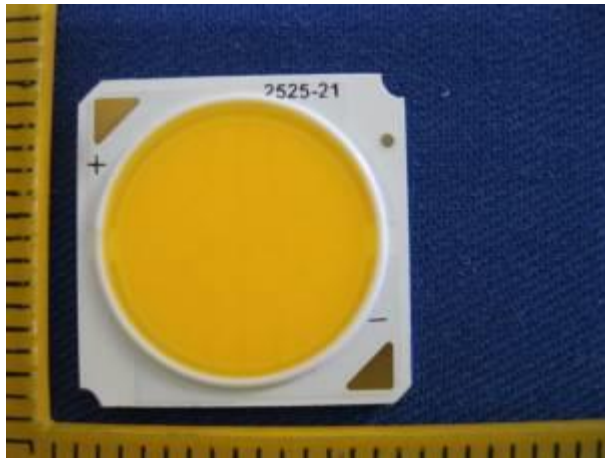
Product	Size	Die count in series	Die count in parallel	CCT	CRI
	23.8*23.8*1.0mm	12	7	3000K	80
	Die Count	Drive Current	Nominal Voltage	Nominal Power	Nominal Light output
2525-21	84	850mA	36V	30W	3000lm
	Drive Current per die	Current Density	Power Density	Die Spacing	
	0.11A	0.00245A/mm ²	0.086W/mm ²	4.12mm ² /pcs	

Product	Size	Die count in series	Die count in parallel	CCT	CRI
	12*15*1.0mm	12	2	3000K	80
	Die Count	Drive Current	Nominal Voltage	Nominal Power	Nominal Light output
1215-7	24	250mA	36V	9W	900lm
	Drive Current per die	Current Density	Power Density	Die Spacing	
	0.12A	0.0025A/mm ²	0.095W/mm ²	3.95mm ² /pcs	

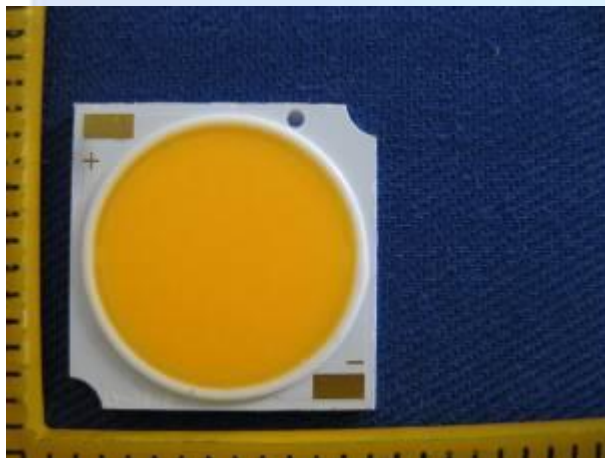
The test date is also applied to the 1215-7 (5W、7W) ;1313-11 (5W、7W) ;1616-9 (5W、8W) ;1919-17 (11W、14W) ;2525-21 (18W、24W)

Applicable product series Photo

2525-21:



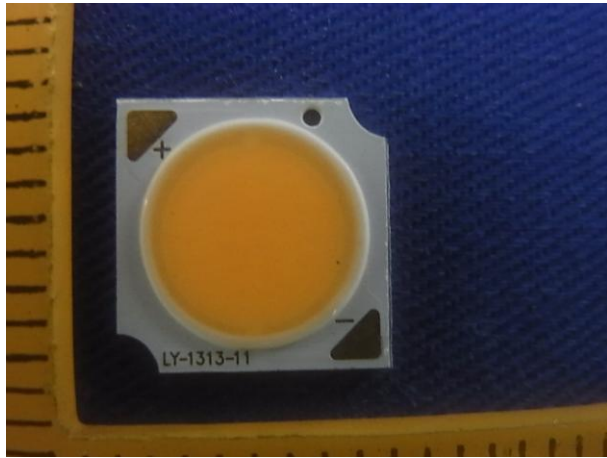
1919-17:



1616-9:



1313-11:



1215-7:

